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Title: New physics searches at SBN detectors
Project Nature: Theory
Abstract:

The Short-Baseline Near Detector (SBND), MicroBooNE and ICARUS-T600 will be the near (110m), intermediate (470m) and far (600m) detectors, sitting in the Booster Neutrino Beam (BNB) at Fermilab as part of the Short-Baseline Neutrino (SBN) program. Because of the large detector size and a high resolution power, SBND will record over a million of neutrino interactions per year. By providing such a high statistics measurement of the unoscillated content of the BNB, SBND is critical in performing searches for beyond the standard model (BSM) physics such as the search of light sterile neutrinos with $\Delta m^2 \sim (0.1\text{-}10)$ eV^2, charged-current (CC) nonstandard interactions NSI, unitarity violation test of the leptonic mixing matrix and the study of neutrino-nucleon interactions at energy $\sim$GeV with a high precision. Due to the very short-baseline there is no possibility of the standard neutrino flavor conversions and the detection of any wrong flavor up to the statistical uncertainties will be a signal of BSM physics. At both source and detector the interaction at quark level is of CC nature which provides a great deal of having the same interaction physics at both ends. This results in fewer NSI parameters and a higher significance level than the case when the BSM parameters were different. I will explore all of the related exotic new physics scenarios at the SBN detectors.